

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of the claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method for detecting a physiological property of a target tissue, comprising: noninvasively inducing a tissue displacement at a target tissue site by applying an ultrasound pulse; noninvasively acquiring data relating to the induced tissue displacement at or in proximity to the target tissue site; and relating the acquired data relating to the induced tissue displacement with a physiological property of the target tissue, wherein said target tissue is selected from the group consisting of CNS tissue, heart tissue, and peripheral nervous system tissue.

Claim 2 (original): A method of claim 1, wherein the data acquired relating to the induced tissue displacement relates to an acoustic property of the target tissue.

Claim 3 (original): A method of claim 2, wherein the data acquired relating to the induced tissue displacement is acquired by administering a plurality of acoustic interrogation pulses to the target tissue site and collecting acoustic data from the target tissue site.

Claim 4 (original): A method of claim 2, wherein the data relates to at least one of the magnitude, amplitude and phase of acoustic scatter.

Claim 5 (original): A method of claim 1, additionally comprising collecting acoustic data relating to the induced tissue displacement from the target tissue site using an ultrasound transducer operating in at least one of the following modes: transmission mode, reflection mode, scatter mode, backscatter mode, emission mode, echo mode, Doppler mode, color Doppler mode, harmonic or subharmonic imaging modes, a-mode, b-mode or m-mode; and correlating the acoustic data relating to the induced tissue displacement with a physiological property of the target tissue.

Claim 6 (currently cancelled).

Claim 7 (original): A method of claim 1, wherein the target tissue is CNS tissue, and the physiological property detected is intracranial pressure.

Claim 8 (original): A method of claim 1, wherein the target tissue is CNS tissue, and the physiological property detected is cerebral perfusion pressure.

Claim 9 (original): A method of claim 1, wherein the target tissue includes or is in proximity to a blood vessel and the physiological property detected is arterial blood pressure.

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Claim 10 (original): A method of claim 1, wherein the target tissue is CNS tissue, and the physiological property detected is selected from the group consisting of: vasospasm, stroke, local edema, infection, vasculitis, subdural or epidural hematomas, subarachnoid hemorrhages, ischemic conditions, multiple sclerosis, Alzheimers disease, hypoxic conditions, intracerebral hemorrhage, tumors and other intracranial masses, and acute, chronic and traumatic conditions and injuries.

Claim 11 (original): A method of claim 1, wherein the target tissue is heart tissue, and the physiological property detected is abnormal heart tissue.

Claim 12 (currently cancelled).

Claim 13 (original): A method of claim 1, wherein the data relating to the induced tissue displacement is acquired using a detection technique selected from the group consisting of: near infrared spectroscopy (NIRS), optical coherence tomography (OCT), magnetic resonance techniques, and positron emission tomography (PET).

Claim 14 (original): A method of claim 1, additionally comprising comparing the acquired data relating to the induced tissue displacement with an empirically determined standard.

Claim 15 (original): A method of claim 1, additionally comprising acquiring multiple data sets, each data set relating to the induced tissue displacement at different points in time relative to the application of the acoustic radiation force.

Claim 16 (original): A method of claim 1, additionally comprising inducing tissue displacement at a second target tissue site different from the first by applying a second ultrasound pulse, acquiring data relating to the induced tissue displacement at or in proximity to the second target tissue site, and comparing the acquired data relating to the tissue displaced at the target tissue site with the acquired data relating to the tissue displaced at the second target tissue site.

Claim 17 (original): A method of claim 1, wherein the target tissue is CNS tissue, and wherein the data acquired relating to the induced tissue displacement relates to an acoustic property of the target tissue, additionally comprising conducting an initial environmental assessment to evaluate the characteristics of the environment between an acoustic source and the target tissue site.

Claim 18 (original): A method of claim 1, additionally comprising acquiring data relating to intrinsic tissue displacements at the target tissue site at multiple time points over the course of at least one cardiac cycle, and correlating the acquired data relating to the intrinsic tissue displacements and the induced tissue displacement at the target tissue site with a physiological property of the target tissue.

Claim 19 (original): A method of claim 1, additionally comprising applying a plurality of different ultrasound pulses to the target tissue site and acquiring data relating to the tissue displacements induced by the different ultrasound pulses.

Claim 20 (original): A method of claim 1, additionally comprising applying a plurality of ultrasound pulses to the target tissue site at a plurality of times and acquiring data relating to the induced tissue displacements.

Claim 21 (original): A method of claim 1, additionally comprising applying a plurality of ultrasound pulses to a plurality of target tissue sites and acquiring data relating to the induced tissue displacements at the plurality of target tissue sites.

c1 Claim 22 (previously cancelled).

Claim 23 (previously cancelled).

Claim 24 (previously cancelled).

Claim 25 (previously cancelled).

Claim 26 (previously cancelled).

Claim 27 (previously cancelled).

Claim 28 (previously cancelled).

Claim 29 (previously cancelled).

Claim 30 (previously cancelled).

Claim 31 (previously cancelled).

Claim 32 (previously cancelled).

Claim 33 (previously cancelled).

Claim 34 (previously cancelled).

Claim 35 (currently amended): A method for assessing a physiological parameter of a target tissue comprising: applying focused ultrasound and inducing oscillation of the target tissue; measuring [a property] at least one of a frequency and an amplitude of an acoustic signal emitted from the target tissue; and relating the [property] frequency or the amplitude of the emitted acoustic signal to a physiological tissue property.

Claim 36 (original): A method for monitoring intracranial pressure (ICP) in a subject, comprising: administering acoustic interrogation signals to a target CNS tissue site in the subject; acquiring acoustic scatter data from the target CNS tissue site; determining the arterial blood pressure (ABP) of the subject; and relating the acquired acoustic scatter data and ABP with ICP.

Claim 37 (original): A method of claim 36, additionally comprising relating the acoustic scatter data to the stiffness or elasticity of the target CNS tissue and relating the stiffness or elasticity of the target tissue with ICP.

Claim 38 (original): A method of claim 36, additionally comprising comparing the ICP and ABP and determining the autoregulation status of the patient.

Claim 39 (currently amended): A system comprising an acoustic source and an acoustic detector, the acoustic source and detector being operably connected to a power source, the power source being operably connected to a function generator, and the function generator being operably connected to a controller having data acquisition, storage and analysis capability, the controller having the capability to process acquired acoustic data and relate acquired acoustic data with at least one physiological tissue condition of target tissue selected from the group consisting of CNS tissue, heart tissue and peripheral nervous system tissue, and the controller being operably connected to a display device for displaying information relating to the at least one physiological tissue condition.

Claim 40 (original): A system of claim 39, wherein an acoustic source and an acoustic detector are provided as an ultrasound transducer.

Claim 41 (original): A system of claim 39, comprising multiple ultrasound transducers.

Claim 42 (original): A system of claim 41, wherein the multiple ultrasound transducers are annular.

Claim 43 (original): A system of claim 39, wherein an acoustic source and detector is provided as a transcranial Doppler device.

Claim 44 (original): A system of claim 39, wherein the display device provides information relating to the ICP, ABP and autoregulation.

Claim 45 (currently cancelled).

Claim 46 (currently amended): A method for localizing a physiological condition or biological response comprising: administering ultrasound pulses to a plurality of targeted tissue sites using a focused acoustic probing technique, and ~~and~~ acquiring data relating to the physiological condition or biological response induced by the ultrasound pulse(s) at each of the targeted tissue sites; and .

Claim 47 (original): A method of claim 46 wherein the physiological condition or biological response is pain and data is acquired by observing the subjective sensation of pain induced, or not, upon application of an ultrasound pulse to each of the targeted tissue sites.

Claim 48 (original): A method of claim 47 for localizing the source of pain in a joint.

Claim 49 (original): A method of claim 47 for localizing a source of pain and diagnosing a condition selected from the group consisting of: appendicitis, cholecystitis, pelvic inflammatory disease, lymphadenopathies, anthrax infection, and peripheral nerve-related conditions.

Claim 50 (currently amended): A method for assessing a physiological property of a target tissue, comprising the steps of:

(a) acquiring acoustic data relating to intrinsic tissue displacements at a target tissue site at multiple time points over the course of at least one cardiac cycle; and

(b) relating the acoustic data with a physiological property of the target tissue, wherein said acoustic data is collected by using an ultrasound transducer, and wherein said target tissue is selected from the group consisting of CNS tissue, heart tissue, and peripheral nervous system tissue.

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Claim 51 (currently amended): The method of any of claims 50 and 69-73, wherein said ultrasound transducer operates in at least one of the following modes: transmission mode, reflection mode, scatter mode, backscatter mode, emission mode, echo mode, Doppler mode, color Doppler mode, harmonic or subharmonic imaging modes, a-mode, b-mode or m-mode; ~~and correlating the acquired acoustic data relating to intrinsic tissue displacement with a physiological property of the target tissue.~~

Claim 52 (currently amended): A method of any of claims 50[[,]] and 69-73, further comprising the step of acquiring acoustic data ~~relating to intrinsic tissue displacements~~ at multiple target tissue sites at multiple time points over the course of at least one cardiac cycle.

Claim 53 (original): The method of claim 50 wherein the acoustic data acquired relating to the intrinsic tissue displacement at the target tissue site relates to acoustic properties of the target tissue.

Claim 54 (currently amended): The method of any of claims [[53]] 50 and 69-73, wherein said acoustic ~~data properties of the target tissue are selected~~ is selected from the group consisting of changes in the amplitude of acoustic signals, changes in phase of acoustic signals, changes in frequency of acoustic signals, changes in acoustic emission signals, changes in length of scattered signals relative to an interrogation signal, changes in maximum and/or minimum amplitude of an acoustic signal within a cardiac cycle, the ratio of the maximum and/or minimum amplitude to

that of the mean or variance of subsequent oscillations within a cardiac cycle, changes in temporal or spatial variance of scattered signals at different times in the same location and/or at the same time in different locations, and rates of change of tissue displacement or relaxation.

Claim 55 (currently amended): The method of any of claims 50 and 69-73, wherein said acoustic data ~~relating to said intrinsic tissue displacement at the target tissue site~~ is acquired by administering acoustic interrogation pulses to the target tissue site and collecting acoustic scatter data.

Claim 56 (previously presented): The method of claim 55 wherein said acoustic scatter data is acquired at a single acoustic frequency.

Claim 57 (previously presented): The method of claim 55 wherein said acoustic scatter data is acquired at multiple acoustic frequencies.

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Claim 58 (currently amended): The method of any of claims 50 and 69-73, further comprising the step of relating the ~~intrinsic tissue displacement~~ acoustic data and additional data relating to blood pressure, cardiac and/or respiratory cycles, to a physiological property of said target tissue.

Claim 59 (currently cancelled).

Claim 60 (previously presented): The method of claim 50 wherein said target tissue includes or is in proximity to a blood vessel and wherein the physiological property detected is arterial blood pressure.

Claim 61 (currently amended): The method of any of claims 58, 59, 69 and 70, wherein said target tissue is CNS tissue and wherein said physiological property of said CNS tissue is selected from the group consisting of intracranial pressure, cerebral perfusion pressure, vasospasm, stroke, local edema, infection, vasculitis, subdural or epidural hematomas, subarachnoid hemorrhage, ischemic conditions, multiple sclerosis, Alzheimers disease, hypoxic conditions,

intracerebral hemorrhage, tumors and other intracranial masses, and acute, chronic and traumatic conditions and injuries.

Claim 62 (new): A method according to claim 35, wherein the target tissue is CNS tissue and the physiological parameter is ICP.

Claim 63 (new): A method of claim 35, wherein inducing oscillation of a target tissue is accomplished by applying a known acoustic radiation force using at least two acoustic sources having frequency modulated output to oscillate the target tissue.

Claim 64 (new): A method of claim 35, wherein inducing oscillation of a target tissue is accomplished by applying a known acoustic radiation force using at least two acoustic sources having phase modulated output.

Claim 65 (new): A method of claim 50, wherein the target tissue is CNS tissue and the tissue property determined is ICP.

C₁ Claim 66 (new): A system of claim 39, wherein the controller is capable of processing acoustic data acquired from CNS target tissue and relating the acquired acoustic data to at least one of ICP, arterial blood pressure (ABP) and cerebral perfusion pressure (CPP).

Claim 67 (new): A system of claim 39, wherein the controller is capable of processing acoustic data acquired from CNS target tissue and relating the acquired acoustic data to intracranial pressure (ICP).

Claim 68 (new): A system of claim 67, wherein the controller is capable of processing acoustic data acquired from CNS target tissue and arterial blood pressure (ABP) data and relating the acquired acoustic data and ABP data to ICP.

Claim 69 (new): A method for assessing a physiological property of a target tissue, comprising the steps of:

(a) acquiring acoustic data relating to a biological response of an intrinsic or induced tissue displacement using an ultrasound transducer; and

(b) relating the acoustic data with a physiological property of the target tissue, wherein said target tissue is selected from the group consisting of CNS tissue, heart tissue, and peripheral nervous system tissue.

Claim 70 (new): A method of claim 69, comprising acquiring acoustic data relating to at least one of changes in local perfusion rate, blood flow velocity, and electrophysiological activity.

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Claim 71 (new): A method for assessing intracranial pressure, comprising:

(a) collecting acoustic data relating to intrinsic tissue displacements at one or more CNS target tissue sites at multiple time points over the course of at least one cardiac cycle using an ultrasound transducer; and

(b) relating the acoustic data with intracranial pressure.

Claim 72 (new): A method for assessing intracranial pressure, comprising:

(a) collecting acoustic data relating to a biological response of an intrinsic or induced CNS tissue displacement using an ultrasound transducer; and

(b) relating the acoustic data with intracranial pressure.

Claim 73 (new): A method of claim 72, comprising collecting acoustic data relating to blood flow velocity from at least one CNS target tissue site and relating the acoustic data relating to blood flow velocity with intracranial pressure.

Claim 74 (new): A method for assessing a physiological parameter of a target tissue comprising: characterizing the acoustic propagation environment by conducting an initial environmental assessment to determine the location and properties of tissue between an acoustic source and the target tissue; applying a known acoustic radiation force using at least one acoustic source to

oscillate the target tissue at a desired target location; examining at least one aspect of the acoustic emission from the vibrated target tissue or fluids in proximity to the target tissue; and determining a tissue property as a function of at least one property of the acoustic emission.

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